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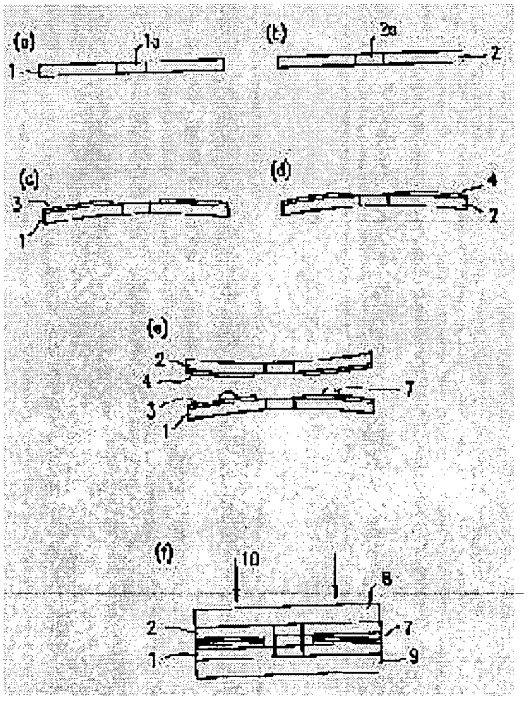
(54) OPTICAL INFORMATION RECORDING MEDIUM AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical information recording medium which is flat without warpage and is low in cost in spite of a one side recording and reproducing type formed by bonding two sheets of thin type substrates to each other and a process for producing the same.

SOLUTION: The optical disk is constituted by bonding a first substrate 1 and a second substrate 2 of 0.6 mm in thickness to each other. Guide grooves for signal recording are formed on the surface of the first substrate 1 and further, the surface is provided with laminated information rewriting layers 3 formed by laminating at least a dielectric layer and a recording layer. The warpage is generated in the first substrate 1 as the substrate is provided with these laminated information rewriting layers 3. The surface of the second substrate 2 is, therefore, provided with the dielectric layer 4 and the warpage is



generated in this second substrate 2 as well and thereafter the first and second substrates 1, 2 are arranged symmetrically with respect to plane. The first and second substrates 1, 2 are then bonded to each other. As a result, the flat planar optical disk is obtd.

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CLAIMS

[Claim(s)]
[Claim 1] The optical information record medium which the front face of the 1st substrate which formed the dielectric layer and the record layer for signal record at least was made to counter the 2nd substrate, stuck said 1st substrate which is the optical information record medium which stuck said the 1st substrate and said 2nd substrate, and curved in the field symmetry mutually, and said 2nd substrate, and was formed in plate-like.
[Claim 2] The optical information record medium according to claim 1 in which the thin film layer was formed on the front face of said 2nd substrate which counters said 1st substrate.
[Claim 3] Said thin film layer is an optical information record medium containing a dielectric layer according to claim 2.
[Claim 4] Said thin film layer is an optical information record medium containing the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate according to claim 2 or 3.
[Claim 5] Said thin film layer is claim 3 containing a metal layer, or an optical information record medium given in either of 4.
[Claim 6] The thickness of said thin film layer is said 1st substrate and an optical information record medium according to claim 2 set as thickness which the curvature of abbreviation identitas produces in said 2nd substrate.
[Claim 7] The optical information record medium according to claim 1 in which the resin layer of a hardening contraction mold was formed to the field of said 2nd substrate of the side which does not counter said 1st substrate.
[Claim 8] Said hardening contraction type of resin layer is an optical information record medium according to claim 7 which is ultraviolet-rays hardening resin.
[Claim 9] Said hardening contraction type of resin layer is a transparent optical information record medium according to claim 7 or 8 to ultraviolet rays.
[Claim 10] Said hardening contraction type of resin layer is an opaque optical information record medium according to claim 7 to 9 to the light.
[Claim 11] The optical information record medium according to claim 10 which formed the pattern by said hardening contraction type of resin layer.
[Claim 12] The curvature of said 2nd substrate is an optical information record medium according to claim 1 produced when producing this 2nd substrate.
[Claim 13] The production approach of said 2nd substrate is an optical information record medium according to claim 12 which is the injection method.
[Claim 14] Either [at least] said 1st substrate or said 2nd substrate is the optical information record medium according to claim 1 which is the thickness of 0.8mm or less.
[Claim 15] The optical information record medium which is equipped with the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the thin film layer in which signal record is impossible was formed, puts said dielectric layer, said record layer, and said thin film layer between said 1st substrate and said 2nd substrate, and stuck this each

substrate.
[Claim 16] Said thin film layer is an optical information record medium containing a dielectric layer according to claim 15.
[Claim 17] Said thin film layer is an optical information record medium containing the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate according to claim 16.
[Claim 18] The thickness of the dielectric layer formed in the front face of said 1st substrate and the thickness of the layer of the same ingredient as this dielectric layer contained in said thin film layer are in abbreviation etc. by carrying out, and it is an optical information record medium according to claim 17.
[Claim 19] The 1st substrate in which two or more dielectric layers, the record layer for signal record which intervenes between this each dielectric layer, and the metal layer were formed, The optical information record medium which is equipped with the 2nd substrate in which the thin film which consists of at least one dielectric layer and a metal layer, and in which signal record is impossible was formed, puts said each dielectric layer, said record layer, and said each metal layer between said 1st substrate and said 2nd substrate, and stuck this each substrate.
[Claim 20] The sum total thickness of each dielectric layer formed in said 1st substrate and the sum total thickness of each dielectric layer formed in said 2nd substrate are in abbreviation etc. by carrying out, and it is an optical information record medium according to claim 19.
[Claim 21] The optical information record medium which stuck this each substrate, without having the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the resin layer of a hardening contraction mold was formed, and putting said dielectric layer and said record layer between said 1st substrate and said 2nd substrate, and making said hardening contraction type of resin layer counter said 1st substrate.
[Claim 22] Said hardening contraction type of resin layer is an optical information record medium according to claim 21 which is ultraviolet-rays hardening resin.
[Claim 23] The optical information record medium which is equipped with the 1st substrate which formed the dielectric layer, the record layer for signal record, and the resin layer of a hardening contraction mold at least, and the 2nd substrate, puts said dielectric layer, said record layer, and said hardening contraction type of resin layer between said 1st substrate and said 2nd substrate, and stuck this each substrate.
[Claim 24] The optical information record medium according to claim 23 in which the resin layer with a tensile stress smaller than said hardening contraction type of said 1st substrate of resin layer was formed on the front face of said 2nd substrate which counters said 1st substrate.
[Claim 25] Said resin layer formed in the front face of said 2nd substrate is an optical information record medium according to claim 24 with thickness thinner than said hardening contraction type of said 1st substrate of resin layer.
[Claim 26] Said resin layer formed in the front face of said 2nd substrate is a transparent optical information record medium according to claim 24 to ultraviolet rays.
[Claim 27] Said resin layer formed in the front face of said 2nd substrate is an opaque optical information record medium according to claim 24 to the light.
[Claim 28] The optical information record medium according to claim 24 which formed the pattern by said resin layer formed in the front face of said 2nd substrate.
[Claim 29] Either [at least] said 1st substrate or said 2nd substrate is the optical information record medium according to claim 23 which is the thickness of 0.8mm or less.
[Claim 30] The manufacture approach of an optical information record medium of having the 1st process which forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, the 2nd process which makes the 2nd substrate generating the same curvature as said 1st substrate, and the 3rd process which arranges said 1st substrate which curved similarly, and said 2nd substrate to the field symmetry, sticks this each substrate, and is made plate-like.
[Claim 31] Said 2nd process is the manufacture approach of the optical information record medium according to claim 30 which is the process which forms a thin film layer in the front face of said 2nd

substrate which counters said 1st substrate.
[Claim 32] Said thin film layer is the manufacture approach of the optical information record medium containing a dielectric layer according to claim 31.
[Claim 33] Said thin film layer is the manufacture approach of the optical information record medium containing the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate according to claim 31 or 32.
[Claim 34] Said thin film layer is the manufacture approach of the optical information record medium containing a metal layer according to claim 32 or 33.
[Claim 35] Said 2nd process is the manufacture approach of the optical information record medium according to claim 30 which is the process which forms the resin layer of a hardening contraction mold in the field of said 2nd substrate of the side which does not counter said 1st substrate.
[Claim 36] Said hardening contraction type of resin layer is the manufacture approach of the optical information record medium according to claim 35 which is ultraviolet-rays hardening resin.
[Claim 37] Said 2nd process is the manufacture approach of the optical information record medium according to claim 30 which is the process which makes this 2nd substrate produce curvature when producing said 2nd substrate.
[Claim 38] The production approach of said 2nd substrate is the manufacture approach of the optical information record medium according to claim 37 which is the injection method.
[Claim 39] The manufacture approach of an optical information record medium of having the 1st process which forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, the 2nd process which forms the resin layer of a hardening contraction mold in the front face of said 1st substrate, and the 3rd process which sticks said the 1st substrate and said 2nd substrate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the recordable optical information record medium which comes to stick two substrates, and its manufacture approach.
[0002]
[Description of the Prior Art] The technique of performing record or playback of high-density information using a laser beam is well-known, for example, the optical disk is put in practical use. An optical disk can be divided roughly into the mold only for playbacks, a postscript mold, and an erasable type. The mold only for playbacks is commercialized as a disk called the laser disc which recorded the disk called the compact disc which recorded music information, and image information, and the postscript mold is commercialized as a text file, a still picture file, etc. In current, researches and developments are furthered focusing on the erasable type, and this erasable type is being commercialized as a data file for personal computers etc.
[0003] The thing which prepared the record layer in one front face of a transparence resin substrate with a thickness of 1.2mm, and prepared protective coats, such as an overcoat, on it as a gestalt of an optical disk, or the thing which stuck the same guard plate as a substrate with adhesives is common.
[0004] On the other hand, in order to attain densification of an optical disk in recent years, laser wavelength is shortened and the examination using an objective lens with big numerical aperture (NA) is made. However, the allowed value of whenever [angle-of-inclination / of the disk to the direction of incidence of laser light] (tilt) becomes small, so that laser wavelength is shortened or a numerical aperture (NA) is enlarged. In order to enlarge the allowed value of this tilt, it is effective to make thin substrate thickness (thickness from a substrate front face to a record layer), for example, it is setting substrate thickness to 0.6mm in the digital videodisc (DVD). In the veneer, since the mechanical strength is weak, a resin substrate with a thickness of 0.6mm carries out a record layer inside, and sticks two substrates.
[0005] lamination -- an approach -- ****** -- hot melt -- resin -- one side -- a substrate -- a field -- having applied -- after -- each -- a substrate -- adhesion - a press -- carrying out -- an approach -- each -- a substrate -- between -- a pressure sensitive adhesive sheet (double-sided tape) -- intervening -- making -- sticking -- doubling -- an approach -- ultraviolet rays -- (-- UV --) -- hardening resin -- one side -- a substrate -- a top -- applying -- each -- a substrate -- sticking -- since -- UV irradiation -- carrying out -- hardening -- making -- an approach -- etc. -- it is .
[0006]
[Problem(s) to be Solved by the Invention] By the way, when thickness of the substrate of a disk was made thin to about 0.6mm and the thin film layer containing a record medium rewritable on the front face of this substrate was formed, it turned out that a substrate curves greatly.
[0007] Such a phenomenon was not generated irrespective of the thin film layer containing the thin film layer containing a rewritable record medium, or the record medium only for playbacks, if it did not generate and the substrate with a thickness of 1.2mm was used, when the thin film layer containing the

record medium only for playbacks (aluminum, Au, etc.), i.e., metallic reflective layers, was formed to this substrate even if it made thickness of the substrate of a disk thin to about 0.6mm.
[0008] Although the dielectric layer which protects a record layer and this record layer is formed as a thin film layer in a rewritable mold, since big internal stress is generated by membrane formation of a dielectric layer, a cause is considered for curving the weak substrate of a mechanical strength.
[0009] When the substrate which has such big curvature, and other substrates which have not curved are stuck and the optical disk in which record playback is possible is produced only from one side, big curvature occurs also in this optical disk, and a practical optical disk cannot be offered.
[0010] However, since both substrate has curved in making two substrates which have the same thin film layer counter and sticking them, each stress can maintain balance and a lamination disk with flatness high as a result can be obtained. However, in the optical disk recorded on one side, it becomes the big factor of a cost rise to prepare the thin film layer in which both sides contain a record layer.
[0011] Then, even if this invention is the one side record playback mold which stuck two thin substrates, it aims at offering the low optical information record medium and its manufacture approach of cost evenly, without curving.
[0012]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the optical information record medium of this invention The front face of the 1st substrate which formed the dielectric layer and the record layer for signal record at least is made to counter the 2nd substrate. Said 1st substrate which is the optical information record medium which stuck said the 1st substrate and said 2nd substrate, and curved in the field symmetry mutually, and said 2nd substrate are stuck, and it comes to form in plate-like.
[0013] The thin film layer is formed in the front face of said 2nd substrate which counters said 1st substrate with 1 operation gestalt.
[0014] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0015] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0016] With 1 operation gestalt, said thin film layer contains a metal layer.
[0017] With 1 operation gestalt, the thickness of said thin film layer is set as thickness which the curvature of said 1st substrate and abbreviation identitas produces in said 2nd substrate.
[0018] The resin layer of a hardening contraction mold is formed in the field of said 2nd substrate of the side which does not counter said 1st substrate with 1 operation gestalt.
[0019] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.
[0020] With 1 operation gestalt, said hardening contraction type of resin layer is transparent to ultraviolet rays.
[0021] With 1 operation gestalt, said hardening contraction type of resin layer is opaque to the light.
[0022] With 1 operation gestalt, the pattern is formed by said hardening contraction type of resin layer.
[0023] With 1 operation gestalt, the curvature of said 2nd substrate is produced, when producing this 2nd substrate. For example, the production approach of said 2nd substrate is the injection method.
[0024] With 1 operation gestalt, either [at least] said 1st substrate or said 2nd substrate is 0.8mm or less in thickness.
[0025] The optical information record medium of this invention is equipped with the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the thin film layer in which signal record is impossible was formed, puts said dielectric layer, said record layer, and said thin film layer between said 1st substrate and said 2nd substrate, and sticks this each substrate.
[0026] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0027] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0028] the thickness of the dielectric layer formed in the front face of said 1st substrate with 1 operation

gestalt, and the thickness of the layer of the same ingredient as this dielectric layer contained in said thin film layer -- abbreviation -- it is equal.
[0029] The 1st substrate with which the optical information record medium of this invention formed two or more dielectric layers, the record layer for signal record which intervenes between this each dielectric layer, and the metal layer, It has the 2nd substrate in which the thin film which consists of at least one dielectric layer and a metal layer and in which signal record is impossible was formed, said each dielectric layer, said record layer, and said each metal layer are put between said 1st substrate and said 2nd substrate, and this each substrate is stuck.
[0030] the sum total thickness of each dielectric layer formed in said 1st substrate with 1 operation gestalt, and the sum total thickness of each dielectric layer formed in said 2nd substrate -- abbreviation -- it is equal.
[0031] The optical information record medium of this invention sticks this each substrate, without having the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the resin layer of a hardening contraction mold was formed, and putting said dielectric layer and said record layer between said 1st substrate and said 2nd substrate, and making said hardening contraction type of resin layer counter said 1st substrate.
[0032] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.
[0033] The optical information record medium of this invention is equipped with the 1st substrate which formed the dielectric layer, the record layer for signal record, and the resin layer of a hardening contraction mold at least, and the 2nd substrate, puts said dielectric layer, said record layer, and said hardening contraction type of resin layer between said 1st substrate and said 2nd substrate, and sticks this each substrate.
[0034] With 1 operation gestalt, the resin layer with a tensile stress smaller than said hardening contraction type of said 1st substrate of resin layer is formed in the front face of said 2nd substrate which counters said 1st substrate.
[0035] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt has thickness thinner than said hardening contraction type of said 1st substrate of resin layer.
[0036] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt is transparent to ultraviolet rays.
[0037] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt is opaque to the light.
[0038] With 1 operation gestalt, the pattern is formed by said resin layer formed in the front face of said 2nd substrate.
[0039] With 1 operation gestalt, either [at least] said 1st substrate or said 2nd substrate is 0.8mm or less in thickness.
[0040] The 1st process at which the manufacture approach of the optical information record medium of this invention forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, It has the 2nd process which makes the 2nd substrate generate the same curvature as said 1st substrate, and the 3rd process which arranges said 1st substrate which curved similarly, and said 2nd substrate to the field symmetry, sticks this each substrate, and is made plate-like.
[0041] With 1 operation gestalt, said 2nd process is a process which forms a thin film layer in the front face of said 2nd substrate which counters said 1st substrate.
[0042] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0043] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0044] With 1 operation gestalt, said thin film layer contains a metal layer.
[0045] With 1 operation gestalt, said 2nd process is a process which forms the resin layer of a hardening contraction mold in the field of said 2nd substrate of the side which does not counter said 1st substrate.
[0046] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.

[0047] With 1 operation gestalt, said 2nd process is a process which makes this 2nd substrate produce curvature, when producing said 2nd substrate. For example, the production approach of said 2nd substrate is the injection method.
[0048] The manufacture approach of the optical information record medium of this invention is the manufacture approach of an optical information record medium of having the 1st process which forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, the 2nd process which forms the resin layer of a hardening contraction mold in the front face of said 1st substrate, and the 3rd process which sticks said the 1st substrate and said 2nd substrate.
[0049]
[Embodiment of the Invention] First, the outline of the operation gestalt of this invention is explained.
[0050] The general structure of a rewritable record medium sandwiches and prepares a record layer among these dielectric layers, and prepares a reflecting layer if needed further while it forms two or more dielectric layers on transparence substrates, such as a polycarbonate. Since a dielectric layer protects a record layer from the invading moisture or oxygen and a record layer reaches an elevated temperature at the time of signal record, with this temperature, there is work of protecting that a substrate receives a damage and almost all things make a dielectric layer indispensable with a rewritable record medium.
[0051] As an ingredient of a dielectric layer, the oxide of a metal or semimetal, a nitride, a chalcogen ghost, Such mixture, such as a fluoride and carbide, SiO2, SiO, aluminum203, GeO2, In 2O3, Ta2O5, TeO2, TiO2, MoO3, WO3 and ZrO2, Si3N4, germanium3N4, AlN, BN, TiN, ZnS and CdS, CdSe, ZnSe, ZnTe, AgF, PbF2, MnF2, specifically Simple substances or such mixture, such as NiF2 and SiC, etc. can use a diamond thin film, diamond-like carbon, etc. further.
[0052] Moreover, when performing phase change record, alloys, such as GeSbTe, InSbTe, InSbTeAg, GaSb, InGaSb, GeSnTe, and AgSbTe, can be used as a record layer ingredient. The ingredient recorded by the mechanism of further others is sufficient. Membrane formation of the above-mentioned dielectric layer or a record layer is realizable with a spatter, a vacuum deposition method, etc. If the thin film layer which contains a dielectric layer in a thin substrate (for example, substrate with a thickness of 0.6mm) is formed with a spatter, a vacuum deposition method, etc., big curvature will be produced in this substrate. When the optical disk in which record playback is possible is produced for the substrate which produced this big curvature, and the substrate which does not have a thin film layer and has not produced curvature only from one side by lamination and this, an optical disk also has big curvature and this optical disk becomes less practical.
[0053] After artificers curved two substrates to same extent or controlled the curvature of one substrate, they controlled curvature for this each substrate small by lamination and this, performed various examination on the radical of the way of thinking of forming a plate-like optical disk, and resulted in this invention.
[0054] Next, each concrete operation gestalt is explained to a detail one by one.
[0055] (Operation gestalt 1) Drawing 1 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 1. Drawing 2 (a) and (b) show the laminated structure on the 1st substrate in the optical disk of the operation gestalt 1, and the laminated structure on the 2nd substrate.
[0056] The optical disk of this operation gestalt 1 comes to stick the 1st substrate 1 and 2nd substrate 2 with a thickness of 0.6mm. The guide rail for signal record is formed in the front face of the 1st substrate 1, and the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least further is prepared in it. By having prepared this laminating information rewriting layer, curvature occurs in the 1st substrate 1. For this reason, prepare a dielectric layer in the field of the 2nd substrate 2, this 2nd substrate 2 is also made to generate curvature, the 1st and 2nd substrates 1 and 2 are arranged to the field symmetry next, and the 1st and 2nd substrates 1 and 2 are stuck. A plate-like optical disk is obtained by this.
[0057] Both drawing 1 (a) and the 1st and 2nd substrates 1 and 2 of (b) are produced by the injection method, and have the same quality of the material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the

main holes 1a and 2a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 1 and 2.

[0058] On the 1st substrate 1, the laminating information rewriting layer 3 is formed like . drawing 1 (c). In detail, as shown in drawing 2 (a), the laminating of the dielectric layer 102 which becomes the front face of the 1st substrate 1 from ZnS-SiO2, the record layer 103 which consists of a GeSbTe alloy, the dielectric layer 104 which consists of ZnS-SiO2, and the metal layer (reflecting layer) 105 which consists of aluminum is carried out one by one. The laminating information rewriting layer 3 consists of a dielectric layer 102, the record layer 103, a dielectric layer 104, and a metal layer 105.

[0059] On the 1st substrate 1, it carries out 110nm laminating by the spatter, using ZnS-SiO2 (it consisting of mixture of ZnS and SiO2) as a dielectric layer 102. Similarly by the spatter 30nm laminating of the GeSbTe alloy which answers laser radiation and carries out a change of state to it being amorphous reversibly between crystals is carried out as a record layer 103 of a phase change mold. Similarly by the spatter It carried out 20nm laminating, having used ZnS-SiO2 as the dielectric layer 104, similarly, it carried out 100nm laminating by the spatter, having used aluminum as the metal layer 105, and the laminating information rewriting layer 3 was formed by this.

[0060] As shown in drawing 1 (c), about 1.5 degrees of the 1st substrate 1 curved on the periphery with the compressive stress of the laminating information rewriting layer 3 so that the laminating information rewriting layer 3 side might become a convex. Most causes of this curvature originate in a dielectric layer 102,104 2, i.e., ZnS-SiO, among the laminating information rewriting layers 3.

[0061] The camber angle was defined like drawing 3 . The substrate 11 equivalent to the 1st and 2nd substrates 1 and 2 was held to susceptor 12 so that it might become level near [the] the core, incidence of the laser light 13 which is parallel light with a diameter of about 1mm was carried out to the 11th page of a substrate from the lower part, and the include angle of this laser beam 13 and the reflected light 14 from the 11th page of a substrate to make was set to camber-angle alpha (degree).

[0062] Although camber-angle alpha permitted by the optical disk changes with equipment which carries out record playback of the optical disk, it is necessary to hold it down, for example to 0.7 degrees or less.

[0063] When the 2nd substrate 2 was stuck with adhesives as it was to the 1st substrate 1 which formed the laminating information rewriting layer 3, even if adhesives were any of hot melt resin and UV hardening resin, there was camber-angle alpha 1 degrees or more of an optical disk, and it was not practical.

[0064] Then, as shown in drawing 2 (b), about 130nm of dielectric layers 4 which consist of ZnS-SiO2 was formed in the front face of the 2nd substrate 2 by the spatter. By this, as shown in drawing 1 (d), the camber angle equivalent to the 1st substrate 1 was given to the 2nd substrate 2.

[0065] Next, as shown in drawing 1 (e), UV hardening resin 7 is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 1. As the dielectric layer 4 of the 2nd substrate 2 is made to counter the 1st substrate 1, the 1st and 2nd substrates 1 and 2 are stuck and it is further shown in drawing 1 (f), the 1st and 2nd substrates 1 and 2 are put between each glass plate 8 and 9. Where the curvature of the 1st and 2nd substrates 1 and 2 is corrected, the UV light 10 was irradiated from the 2nd substrate 2 side, UV hardening resin 7 was stiffened, and the lamination of each of these substrates 1 and 2 was completed.

[0066] In addition, the dielectric layer 4 2 of the 2nd substrate 2, i.e., ZnS-SiO, is abbreviation transparence to UV light.

[0067] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained. Here, as a lamination method of construction, although the UV irradiation method was used, the same effectiveness was acquired also by the hot melt method and the adhesive tape method. Furthermore, after having applied UV hardening resin with a delayed effect to the front face of the 1st and 2nd substrates 1 and 2 by the spin coat or print processes, irradiating UV light and giving adhesiveness to UV hardening resin, the 1st and 2nd substrates 1 and 2 were pressed, and the same effectiveness was acquired also by lamination and the approach (delayed effect UV method) of hardening still more completely. Furthermore, instead of each glass plates 8 and 9, the plate of other

quality of the materials is used, the 1st and 2nd substrates 1 and 2 may be put, or the curvature of the 1st and 2nd substrates 1 and 2 may be corrected by other approaches.
[0068] Moreover, although the same substrate produced by the injection method was used as the 1st and 2nd substrates 1 and 2, the substrate produced with the briquetting machine with which others differ may be used, and a substrate applicable to this example is not limited by the production approach.
[0069] Furthermore, if each dielectric layer 102,104 of the laminating information rewriting layer 3 and the dielectric layer 4 of the 2nd substrate 2 are formed with the same ingredient, the 1st and 2nd substrates 1 and 2 are made to deposit the dielectric which seceded from the single target of the same sputtering system, and there is a merit that each dielectric layer can be formed [both].
[0070] Moreover, the camber angle of the 2nd substrate 2 became large, and when thickness was about 130nm, it turned into the almost same camber angle as the 1st substrate 1, so that thickness was thickened, when ZnS-SiO2 was formed to the 2nd substrate 2. It turned out that the curvature of the optical disk which the stress between two substrates after lamination will balance, and will be obtained as a result if it carries out on which abbreviation etc. spreads the camber angle of the 2nd substrate 2 also becomes small. That is, the dielectric which forms membranes to the 2nd substrate 2 is good to choose thickness so that it may become the same camber angle as the 1st substrate 1. If it is the dielectric layer of the same quality of the material, specifically, a thing with the thickness of the sum total of one thru/or two or more dielectric layers on the 1st substrate 1 and the thickness of the sum total of one thru/or two or more dielectric layers on the 2nd substrate 2 equal to mutual is the most desirable.
[0071] Moreover, metal layers (reflecting layer), such as aluminum-Au, may be further prepared on the dielectric layer 4 of the 2nd substrate 2. Although the this time above-mentioned UV lamination method is inapplicable, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by the metal layer even if a bubble mixes in the spreading side of resin when a metal layer is stuck on the 2nd substrate 2, a good appearance can be acquired.
[0072] Furthermore, although considered as the structure which carried out the laminating of the four layers, a dielectric layer 102, the record layer 103, a dielectric layer 104, and the metal layer 105, as a laminating information rewriting layer 3 of the 1st substrate 1, even if it has other laminated structures, for example, the laminated structure which does not have the metal layer 105, or a laminated structure to which the dielectric layer itself comes to carry out the laminating of two or more kinds of quality of the materials, it is not contrary to the meaning of this invention.
[0073] (Operation gestalt 2) Drawing 4 (a), (b), and (c) show the optical disk of the operation gestalt 2. Drawing 4 (a) shows the laminated structure on the 1st substrate 5, drawing 4 (b) shows the laminated structure on the 2nd substrate 6, and drawing 4 (c) shows the laminated structure of the optical disk containing the 1st and 2nd substrates 5 and 6.
[0074] As shown in drawing 4 (a), the laminating of the dielectric layer 202 which becomes the front face of the 1st substrate 5 from ZnS-SiO2, the dielectric layer 203 which consists of GeN, the record layer 204 which consists of a GeSbTe alloy, the dielectric layer 205 which consists of GeN and the metal layer (reflecting layer) 206 which consists of aluminum, and the overcoat layer 207 is carried out one by one.
[0075] Moreover, as shown in drawing 4 (b), the laminating of the dielectric layer 212 which becomes the front face of the 2nd substrate 6 from ZnS-SiO2, the dielectric layer 213 which consists of GeN, the dielectric layer 215 which consists of GeN and the metal layer (reflecting layer) 216 which consists of aluminum, and the overcoat layer 217 is carried out one by one.
[0076] As shown in drawing 4 (c), each rebound ace court layer 201,211 is formed in lamination and outside both sides of the 1st and 2nd substrates 5 and 6 for the 1st and 2nd substrates 5 and 6 through the resin layer 221.
[0077] Here, the laminated structure on the front face of the 2nd substrate 6 is equal to the thing except the laminated structure on the front face of the 1st substrate 5 to the record layer 204, and has each dielectric layer, a metal layer, and an overcoat layer like the laminated structure on the front face of the 1st substrate 5. Between the 1st and 2nd substrates 5 and 6, each thickness of each dielectric layer except the record layer 204, a metal layer, and an overcoat layer is equal to mutual.

[0078] Thus, when the laminated structure of the 1st and 2nd substrates 5 and 6 is made the same except for the record layer 204, abbreviation etc. is in the 1st and 2nd substrates 5 and 6 by carrying out, stress acts, and extent of the curvature of the 1st and 2nd substrates 5 and 6 becomes equal to mutual. Moreover, since such stress always changes similarly even if each stress which acts on the 1st and 2nd substrates 5 and 6 changes in connection with the passage of time, even if it goes through long days and months, the optical disk which consists of the 1st and 2nd substrates 5 and 6 can be kept flat.
[0079] By the way, when the optical disk shown in drawing 4 (c) is seen from the 2nd substrate 6 side, since it is colored yellow by the dielectric layer 213,215 which consists of GeN, the field which cannot record an optical disk is visible [the light which carried out incidence to the 2nd substrate 6, and was reflected by the metal layer 216] to yellow.
[0080] On the other hand, when an optical disk is seen from the 1st substrate 5 side, the light which carried out incidence to the 1st substrate 5, and was reflected by the metal layer 206 is colored blue by the record layer 204 which is colored yellow by the dielectric layer 203,205 which consists of GeN and which both consists of a GeSbTe alloy. Since extent of the blue coloring by the record layer 204 is strong at this time, the field which can record an optical disk looks blue.
[0081] Therefore, in the case of the optical disk of the laminated structure of drawing 4 (c), discernment of a recording surface and a non-recording surface is easy.
[0082] (Operation gestalt 3) Drawing 5 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 3.
[0083] The optical disk of this operation gestalt 3 comes to stick the 1st substrate 21 and 2nd substrate 22 with a thickness of 0.6mm. The guide rail for signal record is formed in the front face of the 1st substrate 21, and the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least further is prepared in it. By having prepared this laminating information rewriting layer, curvature occurs in the 1st substrate 21. For this reason, prepare the resin layer of a hardening contraction mold in the field of the 2nd substrate 22 of the side which does not counter the 1st substrate 21, this 2nd substrate 22 is also made to generate curvature, the 1st and 2nd substrates 21 and 22 are arranged to the field symmetry next, and the 1st and 2nd substrates 21 and 22 are stuck. A plate-like optical disk is obtained by this. Both drawing 5 (a) and the 1st and 2nd substrates 21 and 22 of (b) are produced by the injection method, and have the same quality of the material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 21a and 22a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 21 and 22.
[0084] On the 1st substrate 21, the laminating information rewriting layer 23 is formed like drawing 5 (c). This laminating information rewriting layer 23 was considered as the same configuration as the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1. Therefore, about 1.5 degrees of the 1st substrate 21 curved on the periphery so that the laminating information rewriting layer 23 side might become a convex.
[0085] On the other hand, (the field with the guide rail of the 2nd substrate 22, the field of the opposite side), and the resin layer of the type which the volume will contract if it hardens were prepared in the field of the 2nd substrate 22 of the side which does not counter the 1st substrate 21. UV hardening resin which is radiation-curing mold resin was specifically dropped on the field of the 2nd substrate 22, the 2nd substrate 22 was rotated (spin coat), it considered as about 5-micrometer homogeneous thickness, and UV light was irradiated after that. UV hardening resin produces 10% or more of volume change in order to carry out hardening contraction. The tensile stress occurred as this result and the field in which the 2nd substrate 22 formed UV hardening resin layer 25 and the field of the opposite side, i.e., a field with a guide rail, curved in the convex like drawing 5 (d).
[0086] Next, UV hardening resin 27 is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 21 like drawing 5 (e). Where made the 2nd substrate 22 counter so that UV hardening resin layer 25 may become outside, it stuck it, it put the 1st and 2nd substrates 21 and 22 between each glass plate 28 and 29 still like drawing 5 (f) and curvature is corrected The UV light 30 was irradiated from the 2nd substrate 22 side, UV hardening resin 27 was stiffened, and lamination was

completed.
[0087] in addition, UV resin layer 25 -- UV light -- receiving -- abbreviation -- the transparent ingredient was used. By considering as abbreviation transparence, the lamination by the above UV hardening resin becomes possible.
[0088] Thus, the tilt of the produced disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained. Here, as a lamination method of construction, although the UV irradiation method was used, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the ****** UV method.
[0089] In addition, although above-mentioned UV lamination method cannot be used if resin opaque in a light field as a UV resin layer 25 is adopted, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by UV resin layer 25 even if the bubble corresponding to the spreading side of resin mixes when opaque UV resin layer 25 is applied, a good appearance can be acquired.
[0090] Furthermore, although the resin layer of a hardening contraction mold was formed with the spin coat method, you may form by print processes etc. Since a pattern can be formed in a resin layer in the case of print processes, it also becomes possible to prepare the field where the appearance of an optical disk becomes still better, and a user can record the contents of record etc. if needed.
[0091] (Operation gestalt 4) Drawing 6 (a) thru/or (e) show the manufacture approach of the optical disk of the operation gestalt 4. Moreover, drawing 7 shows the manufacture approach of the 2nd substrate.
[0092] The optical disk of this operation gestalt 4 comes to stick the 1st substrate 31 and 2nd substrate 32 with a thickness of 0.6mm. Since the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least is prepared in the front face of the 1st substrate 31, curvature occurs in the 1st substrate 31. For this reason, face producing by the injection method which mentions the 2nd substrate 32 later, this 2nd substrate 32 is also made to generate curvature, the 1st and 2nd substrates 31 and 32 are arranged to the field symmetry next, and the 1st and 2nd substrates 31 and 32 are stuck. A plate-like optical disk is obtained by this. Both drawing 6 (a) and the 1st and 2nd substrates 31 and 32 of (b) are produced by the injection method, and have the same quality of the material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 31a and 32a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 31 and 32.
[0093] The injection method is injecting the resin (for example, polycarbonate) fused to the building envelope formed by the metal mold A as shown in drawing 7 , and metal mold B, and the 1st and 2nd substrates 31 and 32 are produced by this. Stamper C is formed in metal mold B, and the guide rail for signal record is formed in the front face of a substrate of this stamper C. At this time, the injected resin does not cool rapidly but the temperature of metal mold is considerably maintained at the appearance by which the configuration of the guide rail of Stamper C is faithfully imprinted to a substrate by the elevated temperature (for example, 100 degrees C or more).
[0094] Here, since the laminating of the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1 and the same layer 33 is carried out on the 1st substrate 31 as shown in drawing 6 (c), about 1.5 degrees of this 1st substrate 31 curve on a periphery.
[0095] Then, it faces producing the 2nd substrate 32 by the injection method, and the same curvature as the 1st substrate 31 is generated so that the field of a guide rail may also become this 2nd substrate 32 a convex side. Adjustment of the camber angle of the 2nd substrate 32 is possible by changing injection conditions.
[0096] For example, if it sets up on the conditions 1 or the conditions 2 that the temperature of metal mold A and metal mold B is shown in the next table, the curvature same to the 2nd substrate 32 as the 1st substrate 31 will occur. In the conditions 2, rather than conditions 1, the curvature of the 2nd substrate 32 becomes large.
[0097]
[Table 1]

		条件1	条件2
温度	金型A	125°C	128°C
	金型B	130°C	130°C

[0098] Conditions 1 and conditions 2 do not have a fault in an example about specific metal mold. According to the structure of metal mold, the quality of the material of a substrate, etc., the conditions for making the 2nd substrate 32 generate the same curvature as the 1st substrate 31 change variously. Moreover, with the temperature of metal mold, since the birefringence property of a substrate etc. changes, it is necessary to set up a temperature setup of metal mold, taking various kinds of properties of a substrate into consideration.
[0099] Next, as shown in drawing 6 (d), UV hardening resin is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 31. As the 2nd substrate 32 is made to counter so that a guide rail side may become inside, and is stuck and it is further shown in drawing 6 (e), the 1st and 2nd substrates 31 and 32 are put between each glass plate 36 and 37. Where curvature is corrected, UV light was irradiated from the 2nd substrate 32 side, UV hardening resin was stiffened, and lamination was completed.
[0100] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained.
[0101] Here, although the UV irradiation method was used as a lamination method of construction, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the delayed effect UV method.
[0102] In addition, if it is the production approach of a substrate that the 2nd substrate 32 may be made to generate curvature although the 2nd substrate 32 is made to produce curvature when producing the 2nd substrate 32 by the injection method, no matter it may be what approach, it is applicable here.
[0103] (Operation gestalt 5) Drawing 8 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 5. Moreover, drawing 9 shows the cross-section structure of the optical disk of the operation gestalt 5.
[0104] The optical disk of this operation gestalt 5 comes to stick the 1st substrate 41 and 2nd substrate 42 with a thickness of 0.6mm. Since the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least is prepared in the front face of the 1st substrate 41, curvature occurs in the 1st substrate 41. For this reason, after preparing the resin layer which carries out hardening contraction further, correcting the curvature of this 1st substrate 41 and returning this 1st substrate 41 on the laminating information rewriting layer of the 1st substrate 41 plate-like, the 1st and 2nd substrates 21 and 22 are stuck. A plate-like optical disk is obtained by this. Both drawing 8 (a) and the 1st substrate 41 and 42 of (b) are produced by the injection method, and have the same quality of the material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 41a and 42a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 41 and 42.
[0105] On the 1st substrate 41, as shown in drawing 8 (c), the laminating information rewriting layer 43 is formed. Since this laminating information rewriting layer 43 was the same configuration as the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1, about 1.5 degrees of the 1st substrate 41 curved on the periphery so that the laminating information rewriting layer 43 side might become a convex.
[0106] Then, as shown in drawing 8 (d), the resin layer 44 of a hardening contraction mold was further formed on the laminating information rewriting layer 43, and the curvature of the 1st substrate 41 was corrected with the stress accompanying contraction of this resin layer 44. Specifically UV hardening resin was dropped on the laminating information rewriting layer 43, the 1st substrate 41 was rotated, the resin layer 44 of the homogeneous thickness of about (spin coat) 5 micrometerm was formed, UV light was irradiated after that, and this resin layer 44 was stiffened. In order to carry out hardening

contraction, 10% or more of volume change was produced, the tensile stress occurred as this result, and UV hardening resin deformed the 1st substrate 41 in the direction in which the curvature of the 1st substrate 41 becomes small.

[0107] Next, as shown in drawing 8 (e), UV hardening resin is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 41 which formed the laminating information rewriting layer 43 and the resin layer 44. As the 2nd substrate 42 is made to counter so that a signal guide rail may become inside, the 1st and 2nd substrates 41 and 42 are stuck and it is further shown in drawing 8 (f), the 1st and 2nd substrates 41 and 42 are put between each glass plate 47 and 48. UV light was irradiated from the 2nd substrate 42 side, UV hardening resin was stiffened, and lamination was completed.

[0108] As shown in drawing 9 , the detail of the cross-section structure of the optical disk of this operation gestalt 5 forms in the front face of the 1st substrate 41 the laminating information rewriting layer 43 which consists of a dielectric layer 122, the record layer 123, a dielectric layer 124, and a metal layer 125, and forms the resin layer 44 and the exaggerated coat layer 126 further. The resin layer 44 is made to intervene between the exaggerated coat layer 126 of the 1st substrate 41, and the 2nd substrate 42, and each rebound ace court layer 121,127 is formed in the lateral surface of lamination and the 1st and 2nd substrates 41 and 42 for the 1st and 2nd substrates 41 and 42.

[0109] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained.

[0110] Here, although the UV irradiation method was used as a lamination method of construction, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the delayed effect UV method.

[0111] Moreover, if it prepares a resin layer with a tensile stress smaller than the resin layer 44 prepared on the 1st substrate 41 in preparing a resin layer also in the field of the 2nd substrate 42 with a guide rail, the tilt after lamination can be made small. Specifically, a resin layer is formed with an ingredient with small hardening contraction thinly [thickness] with the same ingredient as the resin layer 44.

[0112] The reason for preparing a resin layer also in the guide rail side of the 2nd substrate 42 has the weak adhesive strength of the adhesives which stick the 1st and 2nd substrates 41 and 42, and the quality of the material of the 2nd substrate 42 here, and it is for strengthening this adhesive strength. If the resin layer prepared in the 1st substrate 42 at this time is abbreviation transparence to UV light, the same UV lamination method as drawing 8 (f) can be used.

[0113] Although above-mentioned UV lamination method is inapplicable if opaque resin is adopted in a light field as a resin layer prepared in the field of the 2nd substrate 42 with a guide rail, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by this UV resin layer even if the bubble corresponding to the spreading side of resin mixes when opaque UV resin layer is applied, a good appearance can be acquired.

[0114] Furthermore, since the resin layer prepared in the field of the 2nd substrate 42 with a guide rail may be formed by print processes etc. and a pattern can be formed in a resin layer in the case of print processes, the appearance of an optical disk becomes still better.

[0115] In addition, with each above-mentioned operation gestalten 1-5, although the substrate with a thickness of 0.6mm was used, this invention is not limited to the thickness of a substrate.

[0116] However, when the laminating information rewriting layer was formed in the case of the substrate with which thickness exceeds 0.8mm, it is also possible for the include angle at which an optical disk curves to become small, for example, for having stuck the 2nd plate-like substrate on the 1st substrate which curvature produced to hold down the camber angle of an optical disk to 0.7 degrees or less. Therefore, this invention is effective, especially when thickness sticks the substrate which is two less than 0.8mm sheets and produces an optical disk.

[0117] Moreover, although what has a guide rail for signal record was adopted as one side as the 2nd substrate with each above-mentioned operation gestalt, in order not to prepare a record layer in the 2nd substrate, a guide rail may not exist in the 2nd substrate.

[0118]

[Effect of the Invention] According to this invention, a tilt can offer a small and flat optical disk also with the one side record playback mold which stuck two thin substrates so that clearly from the above explanation. That is, the optical information record medium of this invention does not bar short-wavelength-izing of laser, and high NA-ization of an objective lens, but promotes development and offer of the optical disc system in which high density record is more possible.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the recordable optical information record medium which comes to stick two substrates, and its manufacture approach.
[0002]

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PRIOR ART

[Description of the Prior Art] The technique of performing record or playback of high-density information using a laser beam is well-known, for example, the optical disk is put in practical use. An optical disk can be divided roughly into the mold only for playbacks, a postscript mold, and an erasable type. The mold only for playbacks is commercialized as a disk called the laser disc which recorded the disk called the compact disc which recorded music information, and image information, and the postscript mold is commercialized as a text file, a still picture file, etc. In current, researches and developments are furthered focusing on the erasable type, and this erasable type is being commercialized as a data file for personal computers etc.
[0003] The thing which prepared the record layer in one front face of a transparence resin substrate with a thickness of 1.2mm, and prepared protective coats, such as an overcoat, on it as a gestalt of an optical disk, or the thing which stuck the same guard plate as a substrate with adhesives is common.
[0004] On the other hand, in order to attain densification of an optical disk in recent years, laser wavelength is shortened and the examination using an objective lens with big numerical aperture (NA) is made. However, the allowed value of whenever [angle-of-inclination / of the disk to the direction of incidence of laser light] (tilt) becomes small, so that laser wavelength is shortened or a numerical aperture (NA) is enlarged. In order to enlarge the allowed value of this tilt, it is effective to make thin substrate thickness (thickness from a substrate front face to a record layer), for example, it is setting substrate thickness to 0.6mm in the digital videodisc (DVD). In the veneer, since the mechanical strength is weak, a resin substrate with a thickness of 0.6mm carries out a record layer inside, and sticks two substrates.
[0005] lamination -- an approach -- ****** -- hot melt -- resin -- one side -- a substrate -- a field -- having applied -- after -- each -- a substrate -- adhesion - a press -- carrying out -- an approach -- each -- a substrate -- between -- a pressure sensitive adhesive sheet (double-sided tape) -- intervening -- making -- sticking -- doubling -- an approach -- ultraviolet rays -- (-- UV --) -- hardening resin -- one side -- a substrate -- a top -- applying -- each -- a substrate -- sticking -- since -- UV irradiation -- carrying out -- hardening -- making -- an approach -- etc. -- it is .

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, a tilt can offer a small and flat optical disk also with the one side record playback mold which stuck two thin substrates so that clearly from the above explanation. That is, the optical information record medium of this invention does not bar short-wavelength-izing of laser, and high NA-ization of an objective lens, but promotes development and offer of the optical disc system in which high density record is more possible.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, when thickness of the substrate of a disk was made thin to about 0.6mm and the thin film layer containing a record medium rewritable on the front face of this substrate was formed, it turned out that a substrate curves greatly.
[0007] Such a phenomenon was not generated irrespective of the thin film layer containing the thin film layer containing a rewritable record medium, or the record medium only for playbacks, if it did not generate and the substrate with a thickness of 1.2mm was used, when the thin film layer containing the record medium only for playbacks (aluminum, Au, etc.), i.e., metallic reflective layers, was formed to this substrate even if it made thickness of the substrate of a disk thin to about 0.6mm.
[0008] Although the dielectric layer which protects a record layer and this record layer is formed as a thin film layer in a rewritable mold, since big internal stress is generated by membrane formation of a dielectric layer, a cause is considered for curving the weak substrate of a mechanical strength.
[0009] When the substrate which has such big curvature, and other substrates which have not curved are stuck and the optical disk in which record playback is possible is produced only from one side, big curvature occurs also in this optical disk, and a practical optical disk cannot be offered.
[0010] However, since both substrate has curved in making two substrates which have the same thin film layer counter and sticking them, each stress can maintain balance and a lamination disk with flatness high as a result can be obtained. However, in the optical disk recorded on one side, it becomes the big factor of a cost rise to prepare the thin film layer in which both sides contain a record layer.
[0011] Then, even if this invention is the one side record playback mold which stuck two thin substrates, it aims at offering the low optical information record medium and its manufacture approach of cost evenly, without curving.

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the optical information record medium of this invention The front face of the 1st substrate which formed the dielectric layer and the record layer for signal record at least is made to counter the 2nd substrate. Said 1st substrate which is the optical information record medium which stuck said the 1st substrate and said 2nd substrate, and curved in the field symmetry mutually, and said 2nd substrate are stuck, and it comes to form in plate-like.
[0013] The thin film layer is formed in the front face of said 2nd substrate which counters said 1st substrate with 1 operation gestalt.
[0014] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0015] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0016] With 1 operation gestalt, said thin film layer contains a metal layer.
[0017] With 1 operation gestalt, the thickness of said thin film layer is set as thickness which the curvature of said 1st substrate and abbreviation identitas produces in said 2nd substrate.
[0018] The resin layer of a hardening contraction mold is formed in the field of said 2nd substrate of the side which does not counter said 1st substrate with 1 operation gestalt.
[0019] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.
[0020] With 1 operation gestalt, said hardening contraction type of resin layer is transparent to ultraviolet rays.
[0021] With 1 operation gestalt, said hardening contraction type of resin layer is opaque to the light.
[0022] With 1 operation gestalt, the pattern is formed by said hardening contraction type of resin layer.
[0023] With 1 operation gestalt, the curvature of said 2nd substrate is produced, when producing this 2nd substrate. For example, the production approach of said 2nd substrate is the injection method.
[0024] With 1 operation gestalt, either [at least] said 1st substrate or said 2nd substrate is 0.8mm or less in thickness.
[0025] The optical information record medium of this invention is equipped with the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the thin film layer in which signal record is impossible was formed, puts said dielectric layer, said record layer, and said thin film layer between said 1st substrate and said 2nd substrate, and sticks this each substrate.
[0026] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0027] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0028] the thickness of the dielectric layer formed in the front face of said 1st substrate with 1 operation gestalt, and the thickness of the layer of the same ingredient as this dielectric layer contained in said thin film layer -- abbreviation -- it is equal.
[0029] The 1st substrate with which the optical information record medium of this invention formed two

or more dielectric layers, the record layer for signal record which intervenes between this each dielectric layer, and the metal layer, It has the 2nd substrate in which the thin film which consists of at least one dielectric layer and a metal layer and in which signal record is impossible was formed, said each dielectric layer, said record layer, and said each metal layer are put between said 1st substrate and said 2nd substrate, and this each substrate is stuck.
[0030] the sum total thickness of each dielectric layer formed in said 1st substrate with 1 operation gestalt, and the sum total thickness of each dielectric layer formed in said 2nd substrate -- abbreviation -- it is equal.
[0031] The optical information record medium of this invention sticks this each substrate, without having the 1st substrate which formed the dielectric layer and the record layer for signal record at least, and the 2nd substrate in which the resin layer of a hardening contraction mold was formed, and putting said dielectric layer and said record layer between said 1st substrate and said 2nd substrate, and making said hardening contraction type of resin layer counter said 1st substrate.
[0032] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.
[0033] The optical information record medium of this invention is equipped with the 1st substrate which formed the dielectric layer, the record layer for signal record, and the resin layer of a hardening contraction mold at least, and the 2nd substrate, puts said dielectric layer, said record layer, and said hardening contraction type of resin layer between said 1st substrate and said 2nd substrate, and sticks this each substrate.
[0034] With 1 operation gestalt, the resin layer with a tensile stress smaller than said hardening contraction type of said 1st substrate of resin layer is formed in the front face of said 2nd substrate which counters said 1st substrate.
[0035] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt has thickness thinner than said hardening contraction type of said 1st substrate of resin layer.
[0036] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt is transparent to ultraviolet rays.
[0037] Said resin layer formed in the front face of said 2nd substrate with 1 operation gestalt is opaque to the light.
[0038] With 1 operation gestalt, the pattern is formed by said resin layer formed in the front face of said 2nd substrate.
[0039] With 1 operation gestalt, either [at least] said 1st substrate or said 2nd substrate is 0.8mm or less in thickness.
[0040] The 1st process at which the manufacture approach of the optical information record medium of this invention forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, It has the 2nd process which makes the 2nd substrate generate the same curvature as said 1st substrate, and the 3rd process which arranges said 1st substrate which curved similarly, and said 2nd substrate to the field symmetry, sticks this each substrate, and is made plate-like.
[0041] With 1 operation gestalt, said 2nd process is a process which forms a thin film layer in the front face of said 2nd substrate which counters said 1st substrate.
[0042] With 1 operation gestalt, said thin film layer contains a dielectric layer.
[0043] With 1 operation gestalt, said thin film layer contains the layer of the same ingredient as the dielectric layer formed in the front face of said 1st substrate.
[0044] With 1 operation gestalt, said thin film layer contains a metal layer.
[0045] With 1 operation gestalt, said 2nd process is a process which forms the resin layer of a hardening contraction mold in the field of said 2nd substrate of the side which does not counter said 1st substrate.
[0046] With 1 operation gestalt, said hardening contraction type of resin layer is ultraviolet-rays hardening resin.
[0047] With 1 operation gestalt, said 2nd process is a process which makes this 2nd substrate produce curvature, when producing said 2nd substrate. For example, the production approach of said 2nd substrate is the injection method.

[0048] The manufacture approach of the optical information record medium of this invention is the manufacture approach of an optical information record medium of having the 1st process which forms a dielectric layer and the record layer for signal record in the front face of the 1st substrate at least, the 2nd process which forms the resin layer of a hardening contraction mold in the front face of said 1st substrate, and the 3rd process which sticks said the 1st substrate and said 2nd substrate.
[0049]
[Embodiment of the Invention] First, the outline of the operation gestalt of this invention is explained.
[0050] The general structure of a rewritable record medium sandwiches and prepares a record layer among these dielectric layers, and prepares a reflecting layer if needed further while it forms two or more dielectric layers on transparence substrates, such as a polycarbonate. Since a dielectric layer protects a record layer from the invading moisture or oxygen and a record layer reaches an elevated temperature at the time of signal record, with this temperature, there is work of protecting that a substrate receives a damage and almost all things make a dielectric layer indispensable with a rewritable record medium.
[0051] As an ingredient of a dielectric layer, the oxide of a metal or semimetal, a nitride, a chalcogen ghost, Such mixture, such as a fluoride and carbide, SiO2, SiO, aluminum203, GeO2, In 2O3, Ta2O5, TeO2, TiO2, MoO3, WO3 and ZrO2, Si3N4, germanium3N4, AlN, BN, TiN, ZnS and CdS, CdSe, ZnSe, ZnTe, AgF, PbF2, MnF2, specifically Simple substances or such mixture, such as NiF2 and SiC, etc. can use a diamond thin film, diamond-like carbon, etc. further.
[0052] Moreover, when performing phase change record, alloys, such as GeSbTe, InSbTe, InSbTeAg, GaSb, InGaSb, GeSnTe, and AgSbTe, can be used as a record layer ingredient. The ingredient recorded by the mechanism of further others is sufficient. Membrane formation of the above-mentioned dielectric layer or a record layer is realizable with a spatter, a vacuum deposition method, etc. If the thin film layer which contains a dielectric layer in a thin substrate (for example, substrate with a thickness of 0.6mm) is formed with a spatter, a vacuum deposition method, etc., big curvature will be produced in this substrate. When the optical disk in which record playback is possible is produced for the substrate which produced this big curvature, and the substrate which does not have a thin film layer and has not produced curvature only from one side by lamination and this, an optical disk also has big curvature and this optical disk becomes less practical.
[0053] After artificers curved two substrates to same extent or controlled the curvature of one substrate, they controlled curvature for this each substrate small by lamination and this, performed various examination on the radical of the way of thinking of forming a plate-like optical disk, and resulted in this invention.
[0054] Next, each concrete operation gestalt is explained to a detail one by one.
[0055] (Operation gestalt 1) Drawing 1 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 1. Drawing 2 (a) and (b) show the laminated structure on the 1st substrate in the optical disk of the operation gestalt 1, and the laminated structure on the 2nd substrate.
[0056] The optical disk of this operation gestalt 1 comes to stick the 1st substrate 1 and 2nd substrate 2 with a thickness of 0.6mm. The guide rail for signal record is formed in the front face of the 1st substrate 1, and the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least further is prepared in it. By having prepared this laminating information rewriting layer, curvature occurs in the 1st substrate 1. For this reason, prepare a dielectric layer in the field of the 2nd substrate 2, this 2nd substrate 2 is also made to generate curvature, the 1st and 2nd substrates 1 and 2 are arranged to the field symmetry next, and the 1st and 2nd substrates 1 and 2 are stuck. A plate-like optical disk is obtained by this.
[0057] Both drawing 1 (a) and the 1st and 2nd substrates 1 and 2 of (b) are produced by the injection method, and have the same construction material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 1a and 2a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 1 and 2.
[0058] On the 1st substrate 1, the laminating information rewriting layer 3 is formed like . drawing 1 (c).

In detail, as shown in drawing 2 (a), the laminating of the dielectric layer 102 which becomes the front face of the 1st substrate 1 from ZnS-SiO2, the record layer 103 which consists of a GeSbTe alloy, the dielectric layer 104 which consists of ZnS-SiO2, and the metal layer (reflecting layer) 105 which consists of aluminum is carried out one by one. The laminating information rewriting layer 3 consists of a dielectric layer 102, the record layer 103, a dielectric layer 104, and a metal layer 105.
[0059] On the 1st substrate 1, it carries out 110nm laminating by the spatter, using ZnS-SiO2 (it consisting of mixture of ZnS and SiO2) as a dielectric layer 102. Similarly by the spatter 30nm laminating of the GeSbTe alloy which answers laser radiation and carries out a change of state to it being amorphous reversibly between crystals is carried out as a record layer 103 of a phase change mold. Similarly by the spatter It carried out 20nm laminating, having used ZnS-SiO2 as the dielectric layer 104, similarly, it carried out 100nm laminating by the spatter, having used aluminum as the metal layer 105, and the laminating information rewriting layer 3 was formed by this.
[0060] As shown in drawing 1 (c), about 1.5 degrees of the 1st substrate 1 curved on the periphery with the compressive stress of the laminating information rewriting layer 3 so that the laminating information rewriting layer 3 side might become a convex. Most causes of this curvature originate in a dielectric layer 102,104 2, i.e., ZnS-SiO, among the laminating information rewriting layers 3.
[0061] The camber angle was defined like drawing 3 . The substrate 11 equivalent to the 1st and 2nd substrates 1 and 2 was held to susceptor 12 so that it might become level near [the] the core, incidence of the laser light 13 which is parallel light with a diameter of about 1mm was carried out to the 11th page of a substrate from the lower part, and the include angle of this laser beam 13 and the reflected light 14 from the 11th page of a substrate to make was set to camber angle alpha (degree).
[0062] Although camber angle alpha permitted by the optical disk changes with equipment which carries out record playback of the optical disk, it is necessary to hold it down, for example to 0.7 degrees or less.
[0063] When the 2nd substrate 2 was stuck with adhesives as it was to the 1st substrate 1 which formed the laminating information rewriting layer 3, even if adhesives were any of hot melt resin and UV hardening resin, there was camber angle alpha 1 degrees or more of an optical disk, and it was not practical.
[0064] Then, as shown in drawing 2 (b), about 130nm of dielectric layers 4 which consist of ZnS-SiO2 was formed in the front face of the 2nd substrate 2 by the spatter. By this, as shown in drawing 1 (d), the camber angle equivalent to the 1st substrate 1 was given to the 2nd substrate 2.
[0065] Next, as shown in drawing 1 (e), UV hardening resin 7 is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 1. As the dielectric layer 4 of the 2nd substrate 2 is made to counter the 1st substrate 1, the 1st and 2nd substrates 1 and 2 are stuck and it is further shown in drawing 1 (f), the 1st and 2nd substrates 1 and 2 are put between each glass plate 8 and 9. Where the curvature of the 1st and 2nd substrates 1 and 2 is corrected, the UV light 10 was irradiated from the 2nd substrate 2 side, UV hardening resin 7 was stiffened, and the lamination of each of these substrates 1 and 2 was completed.
[0066] In addition, the dielectric layer 4 2 of the 2nd substrate 2, i.e., ZnS-SiO, is abbreviation transparence to UV light.
[0067] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained. Here, as a lamination method of construction, although the UV irradiation method was used, the same effectiveness was acquired also by the hot melt method and the adhesive tape method. Furthermore, after having applied UV hardening resin with a delayed effect to the front face of the 1st and 2nd substrates 1 and 2 by the spin coat or print processes, irradiating UV light and giving adhesiveness to UV hardening resin, the 1st and 2nd substrates 1 and 2 were pressed, and the same effectiveness was acquired also by lamination and the approach (delayed effect UV method) of hardening still more nearly thoroughly. Furthermore, instead of each glass plates 8 and 9, the plate of other construction material is used, the 1st and 2nd substrates 1 and 2 may be put, or the curvature of the 1st and 2nd substrates 1 and 2 may be corrected by other approaches.
[0068] Moreover, although the same substrate produced by the injection method was used as the 1st and

2nd substrates 1 and 2, the substrate produced with the briquetting machine with which others differ may be used, and a substrate applicable to this example is not limited by the production approach.
[0069] Furthermore, if each dielectric layer 102,104 of the laminating information rewriting layer 3 and the dielectric layer 4 of the 2nd substrate 2 are formed with the same ingredient, the 1st and 2nd substrates 1 and 2 are made to deposit the dielectric which seceded from the single target of the same sputtering system, and there is a merit that each dielectric layer can be formed [both].
[0070] Moreover, the camber angle of the 2nd substrate 2 became large, and when thickness was about 130nm, it turned into the almost same camber angle as the 1st substrate 1, so that thickness was thickened, when ZnS-SiO2 was formed to the 2nd substrate 2. It turned out that the curvature of the optical disk which the stress between two substrates after lamination will balance, and will be obtained as a result if it carries out on which abbreviation etc. spreads the camber angle of the 2nd substrate 2 also becomes small. That is, the dielectric which forms membranes to the 2nd substrate 2 is good to choose thickness so that it may become the same camber angle as the 1st substrate 1. If it is the dielectric layer of the same construction material, specifically, a thing with the thickness of the sum total of one thru/or two or more dielectric layers on the 1st substrate 1 and the thickness of the sum total of one thru/or two or more dielectric layers on the 2nd substrate 2 equal to mutual is the most desirable.
[0071] Moreover, metal layers (reflecting layer), such as aluminum-Au, may be further prepared on the dielectric layer 4 of the 2nd substrate 2. Although the this time above-mentioned UV lamination method is inapplicable, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by the metal layer even if a bubble mixes in the spreading side of resin when a metal layer is stuck on the 2nd substrate 2, a good appearance can be acquired.
[0072] Furthermore, although considered as the structure which carried out the laminating of the four layers, a dielectric layer 102, the record layer 103, a dielectric layer 104, and the metal layer 105, as a laminating information rewriting layer 3 of the 1st substrate 1, even if it has other laminated structures, for example, the laminated structure which does not have the metal layer 105, or a laminated structure to which the dielectric layer itself comes to carry out the laminating of two or more kinds of construction material, it is not contrary to the meaning of this invention.
[0073] (Operation gestalt 2) Drawing 4 (a), (b), and (c) show the optical disk of the operation gestalt 2. Drawing 4 (a) shows the laminated structure on the 1st substrate 5, drawing 4 (b) shows the laminated structure on the 2nd substrate 6, and drawing 4 (c) shows the laminated structure of the optical disk containing the 1st and 2nd substrates 5 and 6.
[0074] As shown in drawing 4 (a), the laminating of the dielectric layer 202 which becomes the front face of the 1st substrate 5 from ZnS-SiO2, the dielectric layer 203 which consists of GeN, the record layer 204 which consists of a GeSbTe alloy, the dielectric layer 205 which consists of GeN and the metal layer (reflecting layer) 206 which consists of aluminum, and the overcoat layer 207 is carried out one by one.
[0075] Moreover, as shown in drawing 4 (b), the laminating of the dielectric layer 212 which becomes the front face of the 2nd substrate 6 from ZnS-SiO2, the dielectric layer 213 which consists of GeN, the dielectric layer 215 which consists of GeN and the metal layer (reflecting layer) 216 which consists of aluminum, and the overcoat layer 217 is carried out one by one.
[0076] As shown in drawing 4 (c), each rebound ace court layer 201,211 is formed in lamination and outside both sides of the 1st and 2nd substrates 5 and 6 for the 1st and 2nd substrates 5 and 6 through the resin layer 221.
[0077] Here, the laminated structure on the front face of the 2nd substrate 6 is equal to the thing except the laminated structure on the front face of the 1st substrate 5 to the record layer 204, and has each dielectric layer, a metal layer, and an overcoat layer like the laminated structure on the front face of the 1st substrate 5. Between the 1st and 2nd substrates 5 and 6, each thickness of each dielectric layer except the record layer 204, a metal layer, and an overcoat layer is equal to mutual.
[0078] Thus, when the laminated structure of the 1st and 2nd substrates 5 and 6 is made the same except for the record layer 204, abbreviation etc. is in the 1st and 2nd substrates 5 and 6 by carrying out, stress acts, and extent of the curvature of the 1st and 2nd substrates 5 and 6 becomes equal to mutual.

Moreover, since such stress always changes similarly even if each stress which acts on the 1st and 2nd substrates 5 and 6 changes in connection with the passage of time, even if it goes through long days and months, the optical disk which consists of the 1st and 2nd substrates 5 and 6 can be kept flat.
[0079] By the way, when the optical disk shown in drawing 4 (c) is seen from the 2nd substrate 6 side, since it is colored yellow by the dielectric layer 213,215 which consists of GeN, the field which cannot record an optical disk is visible [the light which carried out incidence to the 2nd substrate 6, and was reflected by the metal layer 216] to yellow.
[0080] On the other hand, when an optical disk is seen from the 1st substrate 5 side, the light which carried out incidence to the 1st substrate 5, and was reflected by the metal layer 206 is colored blue by the record layer 204 which is colored yellow by the dielectric layer 203,205 which consists of GeN and which both consists of a GeSbTe alloy. Since extent of the blue coloring by the record layer 204 is strong at this time, the field which can record an optical disk looks blue.
[0081] Therefore, in the case of the optical disk of the laminated structure of drawing 4 (c), discernment of a recording surface and a non-recording surface is easy.
[0082] (Operation gestalt 3) Drawing 5 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 3.
[0083] The optical disk of this operation gestalt 3 comes to stick the 1st substrate 21 and 2nd substrate 22 with a thickness of 0.6mm. The guide rail for signal record is formed in the front face of the 1st substrate 21, and the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least further is prepared in it. By having prepared this laminating information rewriting layer, curvature occurs in the 1st substrate 21. For this reason, prepare the resin layer of a hardening contraction mold in the field of the 2nd substrate 22 of the side which does not counter the 1st substrate 21, this 2nd substrate 22 is also made to generate curvature, the 1st and 2nd substrates 21 and 22 are arranged to the field symmetry next, and the 1st and 2nd substrates 21 and 22 are stuck. A plate-like optical disk is obtained by this. Both drawing 5 (a) and the 1st and 2nd substrates 21 and 22 of (b) are produced by the injection method, and have the same construction material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 21a and 22a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 21 and 22.
[0084] On the 1st substrate 21, the laminating information rewriting layer 23 is formed like drawing 5 (c). This laminating information rewriting layer 23 was considered as the same configuration as the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1. Therefore, about 1.5 degrees of the 1st substrate 21 curved on the periphery so that the laminating information rewriting layer 23 side might become a convex.
[0085] On the other hand, (the field with the guide rail of the 2nd substrate 22, the field of an opposite hand), and the resin layer of the type which the volume will contract if it hardens were prepared in the field of the 2nd substrate 22 of the side which does not counter the 1st substrate 21. UV hardening resin which is radiation-curing mold resin was specifically dropped on the field of the 2nd substrate 22, the 2nd substrate 22 was rotated (spin coat), it considered as about 5-micrometer homogeneous thickness, and UV light was irradiated after that. UV hardening resin produces 10% or more of volume change in order to carry out hardening contraction. The tensile stress occurred as this result and the field in which the 2nd substrate 22 formed UV hardening resin layer 25 and the field of an opposite hand, i.e., a field with a guide rail, curved in the convex like drawing 5 (d).
[0086] Next, UV hardening resin 27 is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 21 like drawing 5 (e). Where made the 2nd substrate 22 counter so that UV hardening resin layer 25 may become outside, it stuck it, it put the 1st and 2nd substrates 21 and 22 between each glass plate 28 and 29 still like drawing 5 (f) and curvature is corrected The UV light 30 was irradiated from the 2nd substrate 22 side, UV hardening resin 27 was stiffened, and lamination was completed.
[0087] in addition, UV resin layer 25 -- UV light -- receiving -- abbreviation -- the transparent ingredient was used. By considering as abbreviation transparence, the lamination by the above UV hardening resin

becomes possible.
[0088] Thus, the tilt of the produced disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained. Here, as a lamination method of construction, although the UV irradiation method was used, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the ****** UV method.
[0089] In addition, although above-mentioned UV lamination method cannot be used if resin opaque in a light field as a UV resin layer 25 is adopted, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by UV resin layer 25 even if the bubble corresponding to the spreading side of resin mixes when opaque UV resin layer 25 is applied, a good appearance can be acquired.
[0090] Furthermore, although the resin layer of a hardening contraction mold was formed with the spin coat method, you may form by print processes etc. Since a pattern can be formed in a resin layer in the case of print processes, it also becomes possible to prepare the field where the appearance of an optical disk becomes still better, and a user can record the content of record etc. if needed.
[0091] (Operation gestalt 4) Drawing 6 (a) thru/or (e) show the manufacture approach of the optical disk of the operation gestalt 4. Moreover, drawing 7 shows the manufacture approach of the 2nd substrate.
[0092] The optical disk of this operation gestalt 4 comes to stick the 1st substrate 31 and 2nd substrate 32 with a thickness of 0.6mm. Since the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least is prepared in the front face of the 1st substrate 31, curvature occurs in the 1st substrate 31. For this reason, face producing by the injection method which mentions the 2nd substrate 32 later, this 2nd substrate 32 is also made to generate curvature, the 1st and 2nd substrates 31 and 32 are arranged to the field symmetry next, and the 1st and 2nd substrates 31 and 32 are stuck. A plate-like optical disk is obtained by this. Both drawing 6 (a) and the 1st and 2nd substrates 31 and 32 of (b) are produced by the injection method, and have the same construction material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 31a and 32a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 31 and 32.
[0093] The injection method is injecting the resin (for example, polycarbonate) fused to the building envelope formed by the metal mold A as shown in drawing 7 , and metal mold B, and the 1st and 2nd substrates 31 and 32 are produced by this. Stamper C is formed in metal mold B, and the guide rail for signal record is formed in the front face of a substrate of this stamper C. At this time, the injected resin does not cool rapidly but the temperature of metal mold is considerably maintained at the appearance by which the configuration of the guide rail of Stamper C is faithfully imprinted to a substrate by the elevated temperature (for example, 100 degrees C or more).
[0094] Here, since the laminating of the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1 and the same layer 33 is carried out on the 1st substrate 31 as shown in drawing 6 (c), about 1.5 degrees of this 1st substrate 31 curve on a periphery.
[0095] Then, it faces producing the 2nd substrate 32 by the injection method, and the same curvature as the 1st substrate 31 is generated so that the field of a guide rail may also become this 2nd substrate 32 a convex side. Adjustment of the camber angle of the 2nd substrate 32 is possible by changing injection conditions.
[0096] For example, if it sets up on the conditions 1 or the conditions 2 that the temperature of metal mold A and metal mold B is shown in the following table, the curvature same to the 2nd substrate 32 as the 1st substrate 31 will occur. In the conditions 2, rather than conditions 1, the curvature of the 2nd substrate 32 becomes large.
[0097]
[A table 1]

		条件1	条件2
温度	金型A	125°C	128°C
	金型B	130°C	130°C

[0098] Conditions 1 and conditions 2 do not have a fault in an example about specific metal mold. According to the structure of metal mold, the construction material of a substrate, etc., the conditions for making the 2nd substrate 32 generate the same curvature as the 1st substrate 31 change variously. Moreover, with the temperature of metal mold, since the birefringence property of a substrate etc. changes, it is necessary to set up temperature setting out of metal mold, taking various kinds of properties of a substrate into consideration.
[0099] Next, as shown in drawing 6 (d), UV hardening resin is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 31. As the 2nd substrate 32 is made to counter so that a guide rail side may become inside, and is stuck and it is further shown in drawing 6 (e), the 1st and 2nd substrates 31 and 32 are put between each glass plate 36 and 37. Where curvature is corrected, UV light was irradiated from the 2nd substrate 32 side, UV hardening resin was stiffened, and lamination was completed.
[0100] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained.
[0101] Here, although the UV irradiation method was used as a lamination method of construction, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the delayed effect UV method.
[0102] In addition, if it is the production approach of a substrate that the 2nd substrate 32 may be made to generate curvature although the 2nd substrate 32 is made to produce curvature when producing the 2nd substrate 32 by the injection method, no matter it may be what approach, it is applicable here.
[0103] (Operation gestalt 5) Drawing 8 (a) thru/or (f) show the manufacture approach of the optical disk of the operation gestalt 5. Moreover, drawing 9 shows the cross-section structure of the optical disk of the operation gestalt 5.
[0104] The optical disk of this operation gestalt 5 comes to stick the 1st substrate 41 and 2nd substrate 42 with a thickness of 0.6mm. Since the laminating information rewriting layer which comes to carry out the laminating of a dielectric layer and the record layer at least is prepared in the front face of the 1st substrate 41, curvature occurs in the 1st substrate 41. For this reason, after preparing the resin layer which carries out hardening contraction further, correcting the curvature of this 1st substrate 41 and returning this 1st substrate 41 on the laminating information rewriting layer of the 1st substrate 41 plate-like, the 1st and 2nd substrates 21 and 22 are stuck. A plate-like optical disk is obtained by this. Both drawing 8 (a) and the 1st substrate 41 and 42 of (b) are produced by the injection method, and have the same construction material, a configuration, and magnitude, for example, are polycarbonate substrates with the thickness of 0.6mm, a diameter [of 120mm], and a diameter [of the main holes 41a and 42a] of 15mm. The guide rail for signal record is prepared in the top face of the 1st and 2nd substrates 41 and 42.
[0105] On the 1st substrate 41, as shown in drawing 8 (c), the laminating information rewriting layer 43 is formed. Since this laminating information rewriting layer 43 was the same configuration as the laminating information rewriting layer 3 of the above-mentioned operation gestalt 1, about 1.5 degrees of the 1st substrate 41 curved on the periphery so that the laminating information rewriting layer 43 side might become a convex.
[0106] Then, as shown in drawing 8 (d), the resin layer 44 of a hardening contraction mold was further formed on the laminating information rewriting layer 43, and the curvature of the 1st substrate 41 was corrected with the stress accompanying the cutback of this resin layer 44. Specifically UV hardening resin was dropped on the laminating information rewriting layer 43, the 1st substrate 41 was rotated, the resin layer 44 of the homogeneous thickness of about (spin coat) 5 micrometerm was formed, UV light was irradiated after that, and this resin layer 44 was stiffened. In order to carry out hardening

contraction, 10% or more of volume change was produced, the tensile stress occurred as this result, and UV hardening resin deformed the 1st substrate 41 in the direction in which the curvature of the 1st substrate 41 becomes small.

[0107] Next, as shown in drawing 8 (e), UV hardening resin is dropped in the shape of a concentric circle near the inner circumference on the 1st substrate 41 which formed the laminating information rewriting layer 43 and the resin layer 44. As the 2nd substrate 42 is made to counter so that a signal guide rail may become inside, the 1st and 2nd substrates 41 and 42 are stuck and it is further shown in drawing 8 (f), the 1st and 2nd substrates 41 and 42 are put between each glass plate 47 and 48. UV light was irradiated from the 2nd substrate 42 side, UV hardening resin was stiffened, and lamination was completed.

[0108] As shown in drawing 9 , the detail of the cross-section structure of the optical disk of this operation gestalt 5 forms in the front face of the 1st substrate 41 the laminating information rewriting layer 43 which consists of a dielectric layer 122, the record layer 123, a dielectric layer 124, and a metal layer 125, and forms the resin layer 44 and the exaggerated coat layer 126 further. The resin layer 44 is made to intervene between the exaggerated coat layer 126 of the 1st substrate 41, and the 2nd substrate 42, and each rebound ace court layer 121,127 is formed in the lateral surface of lamination and the 1st and 2nd substrates 41 and 42 for the 1st and 2nd substrates 41 and 42.

[0109] Thus, the tilt of the produced optical disk is 0.5 degrees or less, and the sufficiently practical optical disk was obtained.

[0110] Here, although the UV irradiation method was used as a lamination method of construction, the same effectiveness was acquired also with the hot melt method, the adhesive tape method, and the delayed effect UV method.

[0111] Moreover, if it prepares a resin layer with a tensile stress smaller than the resin layer 44 prepared on the 1st substrate 41 in preparing a resin layer also in the field of the 2nd substrate 42 with a guide rail, the tilt after lamination can be made small. Specifically, a resin layer is formed with an ingredient with small hardening contraction thinly [thickness] with the same ingredient as the resin layer 44.

[0112] The reason for preparing a resin layer also in the guide rail side of the 2nd substrate 42 has the weak adhesive strength of the adhesives which stick the 1st and 2nd substrates 41 and 42, and the construction material of the 2nd substrate 42 here, and it is for strengthening this adhesive strength. If the resin layer prepared in the 1st substrate 42 at this time is abbreviation transparence to UV light, the same UV lamination method as drawing 8 (f) can be used.

[0113] Although above-mentioned UV lamination method is inapplicable if opaque resin is adopted in a light field as a resin layer prepared in the field of the 2nd substrate 42 with a guide rail, the hot melt method, a delayed effect UV method, etc. are applicable. Since the bubble of this spreading side is covered by this UV resin layer even if the bubble corresponding to the spreading side of resin mixes when opaque UV resin layer is applied, a good appearance can be acquired.

[0114] Furthermore, since the resin layer prepared in the field of the 2nd substrate 42 with a guide rail may be formed by print processes etc. and a pattern can be formed in a resin layer in the case of print processes, the appearance of an optical disk becomes still better.

[0115] In addition, with each above-mentioned operation gestalten 1-5, although the substrate with a thickness of 0.6mm was used, this invention is not limited to the thickness of a substrate.

[0116] However, when the laminating information rewriting layer was formed in the case of the substrate with which thickness exceeds 0.8mm, it is also possible for the include angle at which an optical disk curves to become small, for example, for having stuck the 2nd plate-like substrate on the 1st substrate which curvature produced to suppress the camber angle of an optical disk at 0.7 degrees or less. Therefore, this invention is effective, especially when thickness sticks the substrate which is two less than 0.8mm sheets and produces an optical disk.

[0117] Moreover, although what has a guide rail for signal record was adopted as one side as the 2nd substrate with each above-mentioned operation gestalt, in order not to prepare a record layer in the 2nd substrate, a guide rail may not exist in the 2nd substrate.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] (a) Or (f) shows the manufacture approach of the optical disk which is the operation gestalt 1 of the invention in this application. The sectional view of the 1st substrate in which the sectional view of the 1st substrate and (b) established the sectional view of the 2nd substrate, and, as for (c), (a) established the laminating information rewriting layer, The sectional view of the 2nd substrate with which (d) was equipped with the thin film, the sectional view of a process where (e) applies adhesives between the 1st substrate and the 2nd substrate, and (f) are the sectional views of the lamination process of the 1st substrate and the 2nd substrate.
[Drawing 2] The sectional view showing the laminated structure on the 1st substrate [in / in (a) / the optical disk of the operation gestalt 1] and (b) are the sectional views showing the laminated structure on the 2nd substrate in the optical disk of the operation gestalt 1.
[Drawing 3] It is drawing showing the measuring method of the camber angle of a substrate.
[Drawing 4 a] It is the sectional view showing the laminated structure on the 1st substrate in the optical disk of the operation gestalt 2 of the invention in this application.
[Drawing 4 b] It is the sectional view showing the laminated structure on the 2nd substrate in the optical disk of the operation gestalt 2.
[Drawing 4 c] It is the sectional view showing the optical disk of the operation gestalt 2.
[Drawing 5] (a) Or (f) shows the manufacture approach of the optical disk which is the operation gestalt 3 of the invention in this application. The sectional view of the 1st substrate in which the sectional view of the 1st substrate and (b) established the sectional view of the 2nd substrate, and, as for (c), (a) established the laminating information rewriting layer, The sectional view of the 2nd substrate with which (d) was equipped with the thin film, the sectional view of a process where (e) applies adhesives between the 1st substrate and the 2nd substrate, and (f) are the sectional views of the lamination process of the 1st substrate and the 2nd substrate.
[Drawing 6] (a) Or (e) shows the manufacture approach of the optical disk which is the operation gestalt 4 of the invention in this application. The sectional view of the 1st substrate in which the sectional view of the 1st substrate and (b) established the sectional view of the 2nd substrate, and (c) established the laminating information rewriting layer, the sectional view of a process where (d) applies adhesives between the 1st substrate and the 2nd substrate, and (e) of (a) are the sectional views of the lamination process of the 1st substrate and the 2nd substrate.
[Drawing 7] It is the sectional view showing the metal mold for manufacturing the 2nd substrate of the operation gestalt 4.
[Drawing 8] (a) Or (f) shows the manufacture approach of the optical disk which is the operation gestalt 5 of the invention in this application. The sectional view of the 1st substrate in which the sectional view of the 1st substrate and (b) established the sectional view of the 2nd substrate, and, as for (c), (a) established the laminating information rewriting layer, The sectional view of the 1st substrate with which (d) prepared the thin film on the laminating information rewriting layer, the sectional view of a process where (e) applies adhesives between the 1st substrate and the 2nd substrate, and (f) are the

sectional views of the lamination process of the 1st substrate and the 2nd substrate.
[Drawing 9] It is the sectional view showing the optical disk of the operation gestalt 5.
[Description of Notations]
1, 21, 31, 41 The 1st substrate
2, 22, 32, 42 The 2nd substrate
3 Laminating Information Rewriting Layer
4 Dielectric Layer
8, 9, 28, 29, 38, 39, 48, 49 Glass plate
25 UV Hardening Resin Layer
44 Resin Layer

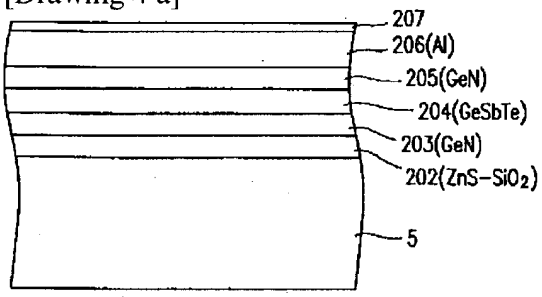
[Translation done.]

* NOTICES *

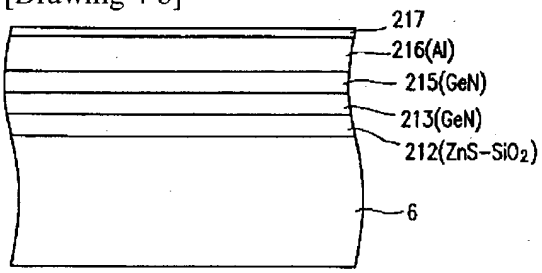
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

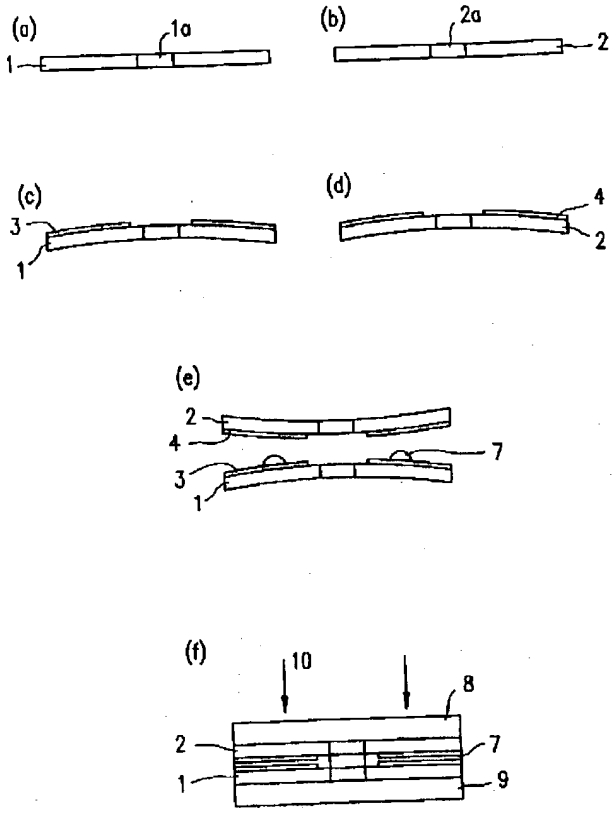
[Drawing 4 a]



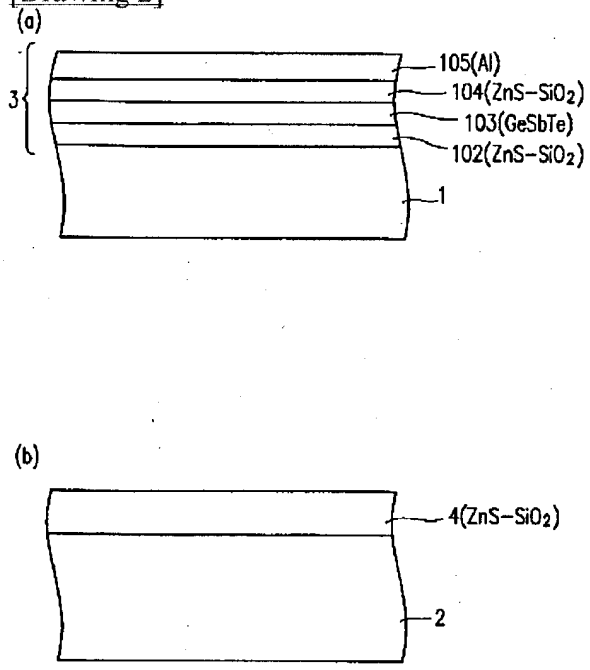
[Drawing 4 b]



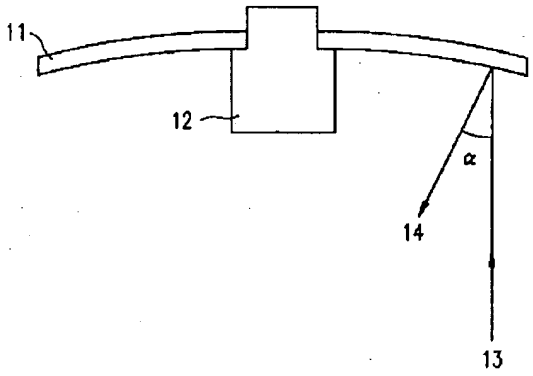
[Drawing 1]



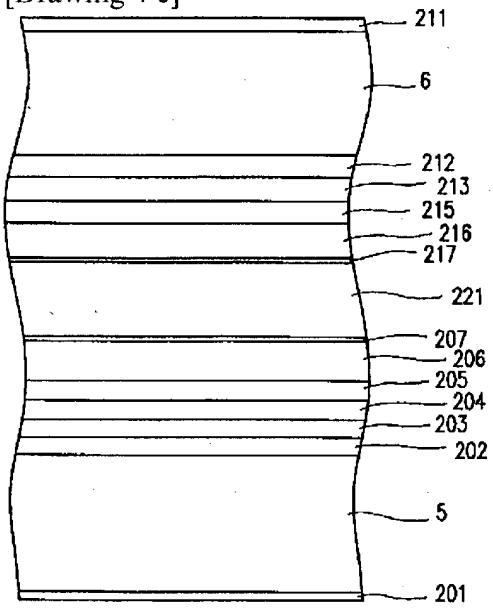
[Drawing 2]



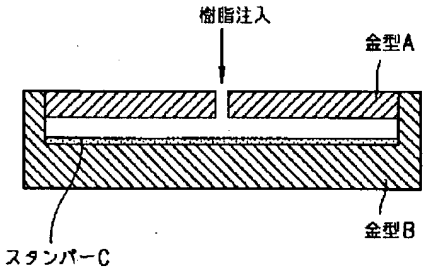
[Drawing 3]



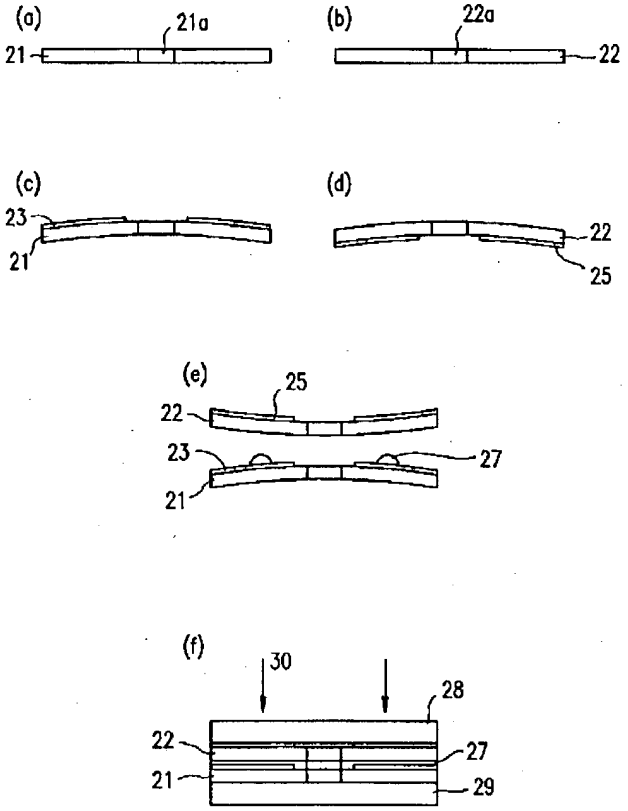
[Drawing 4 c]



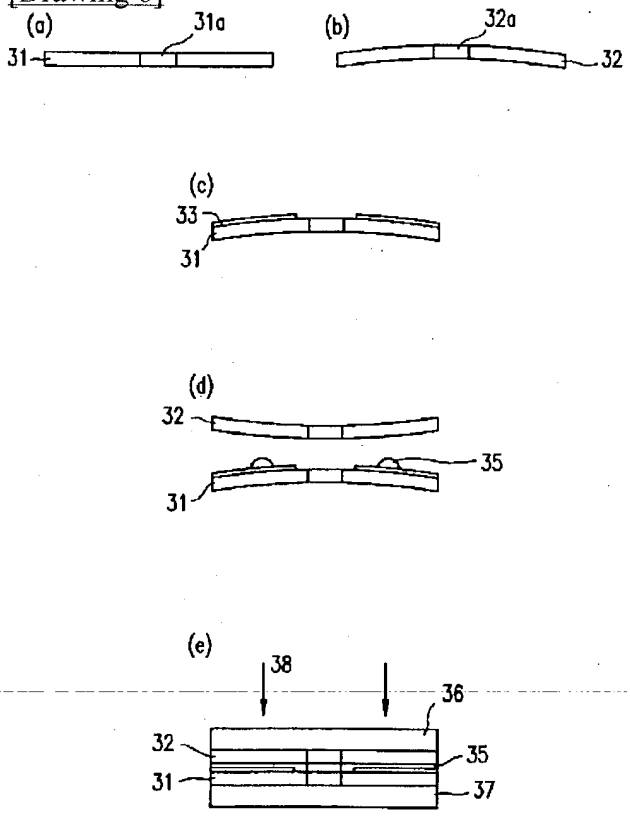
[Drawing 7]



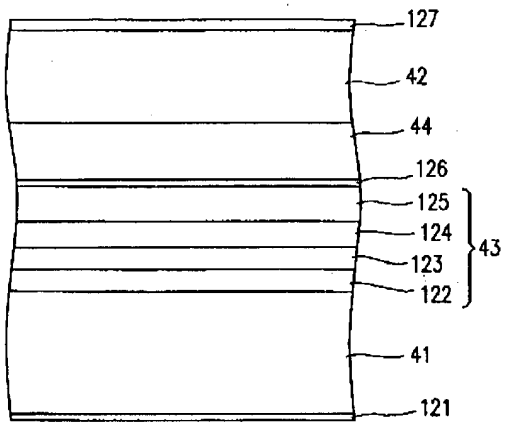
[Drawing 5]



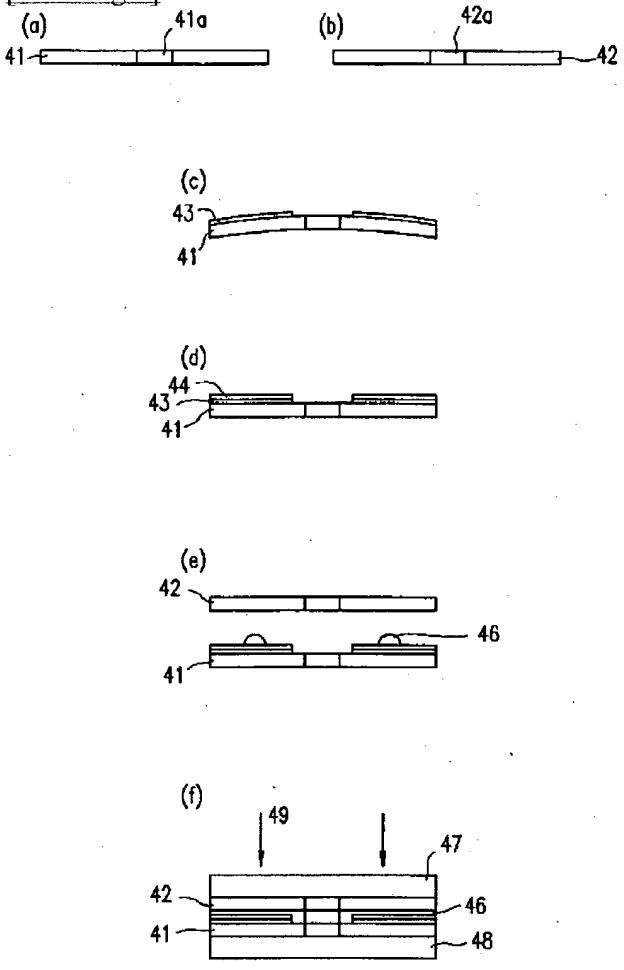
[Drawing 6]



[Drawing 9]



[Drawing 8]



[Translation done.]